



Office of Energy Efficiency
and Renewable Energy



Ford P2000 Incorporates Hybrid Electric Vehicle Technologies

Background

Within the Partnership for a New Generation of Vehicles (PNGV) program, the U.S. Department of Energy and Ford Motor Company are working together to develop hybrid electric vehicle (HEV) technologies for a mid-size family sedan that achieves maximum fuel economy [up to 80 miles per gallon (mpg)] by 2004. Ford recently demonstrated the integration of HEV technologies into the P2000 Prodigy research vehicle.



HEV Technology

Accomplishments

- ◆ Extensive use of advanced lightweight materials, such as carbon fiber composites, magnesium, and aluminum, resulting in a 40% weight reduction as compared to a conventional vehicle.
- ◆ A 1.2-liter, direct-injection aluminum-through-bolt assembly (DIATA) diesel engine, generating 55 kilowatts with a thermal efficiency of 40% (35% more efficient than gasoline engines).
- ◆ A single electric motor – a starter/alternator that functions to rapidly start the DIATA engine, provide power assist during acceleration, and convert braking energy to electricity, thus recharging a small, high-power nickel-metal-hydride battery.
- ◆ An electronically (automatically) shifted manual transmission that is 20% more efficient than a conventional automatic transmission.
- ◆ Fuel economy greater than 50 miles per gallon gasoline equivalent (mpge).

- ◆ Represents a viable candidate for Ford Motor Company's first mass-produced HEV.
- ◆ Represents an important achievement on the road to the PNGV 80 mpg goal, and sets the stage for the delivery of the production prototype vehicle in 2004.

Future Activities

- ◆ Identify more cost-effective uses of aluminum and other lightweight materials in automotive production.
- ◆ Reduce the particulate and nitrogen oxide emissions from diesel engines to meet the most stringent future emission standards.
- ◆ Improve the cost and performance of power electronics and high-power batteries.

Partners in Success

FEV Engine Technology
Ford Motor Company
Milford Fabricating Company
National Renewable Energy Laboratory

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Benefits

- ◆ Demonstrates a careful integration of an advanced diesel engine, lightweight materials, nickel-metal-hydride battery, and automotive transmission technologies.
- ◆ Demonstrates high fuel economy, correspondingly lower greenhouse gas emissions, and extended driving range.